Name: _____   Date: _____
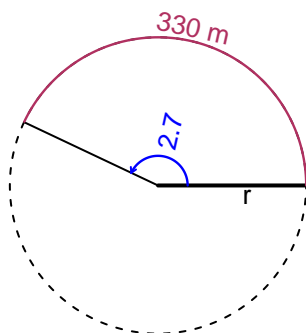
Trig Final (Solution v7)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 330 meters. The angle measure is 2.7 radians. How long is the radius in meters?
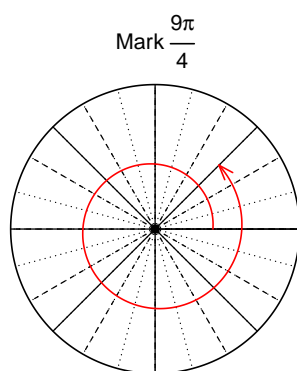

$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$
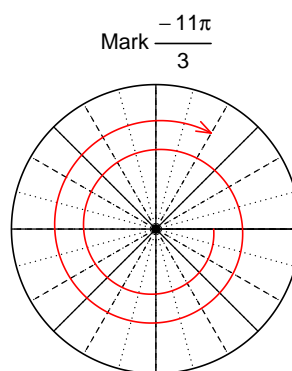
$r = 122.2$ meters.

Question 2

Consider angles $\frac{9\pi}{4}$ and $\frac{-11\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{9\pi}{4}\right)$ and $\sin\left(\frac{-11\pi}{3}\right)$ by using a unit circle (provided separately).

Mark $\dfrac{9\pi}{4}$

Find cos(9π/4)

Mark $\dfrac{-11\pi}{3}$

Find sin(−11π/3)

$\cos(9\pi/4) = \frac{\sqrt{2}}{2}$

$\sin(-11\pi/3) = \frac{\sqrt{3}}{2}$

1

Question 3

If $\cos(\theta) = \frac{-11}{61}$, and θ is in quadrant III, determine an exact value for $\sin(\theta)$.
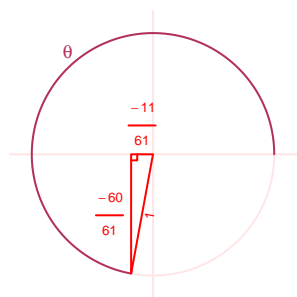
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.

Solve the Pythagorean Equation

$$11^2 + B^2 = 61^2$$
$$B = \sqrt{61^2 - 11^2}$$
$$B = 60$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.

$$\sin(\theta) = \frac{-60}{61}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 6.76$ meters, a frequency of 4.54 Hz, and an amplitude of 8.8 meters. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -8.8 \sin(2\pi 4.54t) + 6.76$$

or

$$y = -8.8 \sin(9.08\pi t) + 6.76$$

or

$$y = -8.8 \sin(28.53t) + 6.76$$